



National Aeronautics and Space Administration
Goddard Space Flight Center

Wallops Flight Facility, Wallops Island, Virginia

Inside Wallops

Volume XX-00

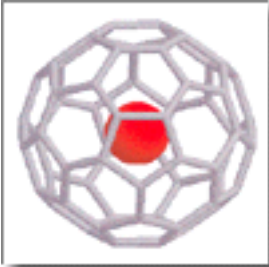
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March 27, 2000

Researchers Discover Extraterrestrial Gases in Buckyballs

Extraterrestrial gases, including helium, are trapped in “buckyball” molecules in a layer of sedimentary clay found in many places on Earth, according to a paper published in the Proceedings of the National Academy of Sciences.

The discovery provides a new tool for tracing asteroid and comet impacts in Earth’s geological and biological records. A University of Hawaii geochemist and her colleagues, including a NASA scientist, found gases that did



Artist's Concept

not originate on Earth inside buckyballs, or fullerene carbon molecules.

The fullerene molecule is a hollow, cage-like structure typically made of 60 or more carbon atoms; it is also referred to as a “buckyball,” in honor of Buckminster Fuller, designer of the geodesic dome that resembles the molecule.

“We discovered extraterrestrial noble gases trapped inside buckyballs in a one-inch thick sedimentary layer of clay that is exposed at several locations on Earth,” said Ted Bunch, a scientist at NASA’s Ames Research Center. “The buckyballs containing the gases arrived on Earth about 65 million years ago during an asteroid impact that scientists theorize ended the age of the dinosaurs. The clay layer that formed from fallout of the impact debris was globally distributed,” Bunch explained.

Scientists say the finding also supports the theory that atmospheric gases and organic compounds arrived on the Earth’s surface during asteroid and comet strikes early in the planet’s history when impacts were numerous. The scientists found significant quantities of very large fullerene molecules, some containing as many as 400 carbon atoms, in samples from the 4.6-billion-year-old Allende meteorite that landed in Mexico three decades ago.

The subsequent work examined several Cretaceous/Tertiary boundary clay sediments distributed worldwide, including deposits in Denmark, New Zealand and North America. In each case, the researchers found fullerenes that encapsulated noble gases with unmistakable extraterrestrial and possibly extra-solar isotopic signatures.

The scientists examined the one-inch clay layer because it is a well-studied sediment that contains extraterrestrial iridium and highly shocked minerals resulting from an asteroid impact 65 million years ago. A highly shocked mineral is one that has experienced temperatures of more than 2,000 C and pressures of about 400,000 atmospheres from impact shock. The clay layer documents a period of abrupt change in biological evolution, including mass extinction of the dinosaurs, now generally attributed to the impact of a carbonaceous asteroid with the Earth.

Luann Becker, of the University of Hawaii, said she hopes to expand the research to examine other periods of mass extinction such as the even more devastating event that formed the 250-million-year-old Permian/Triassic layer of sediment. She added that she hopes to determine if impacts with Earth trigger global change, including whether fullerenes of extraterrestrial origin delivered gases and carbon necessary to establish life on Earth.

“We now have a powerful new tracer to look at sediment layers very carefully,” Becker said. “It opens new possibilities in looking at the problem of how planetary atmospheres evolved and maybe even how life evolved on Earth and perhaps on other moons and planets.” She said she also hopes to work with astronomers to study the formation of fullerenes. “We have yet to learn why these things are there and what they tell us about carbon in the universe. We need to figure out how to establish their existence and how to search for it.”

Wallops Shorts.....

On the Road

Jack Vieira, Range and Mission Management Office, participated in a Career Fair at Pocomoke Middle School on March 21.

Goddard “Earth Awareness 2000” Commemorative Wine

Orders for Goddard’s “Earth Awareness 2000” commemorative wine will be taken through April 12. Earth Awareness 2000 is an award-winning dessert wine from Maryland’s Elk Run Vineyard. It comes in a 375 ml bottle with a beautiful commemorative label. The cost is \$13 per bottle. For more information or to place an order, call Sherry Kleckner, x1204.

Glast Secondary Investigation Selected to Monitor Gamma Ray Bursts

NASA has selected the Gamma-Ray Burst Monitor (GBM) to be flown on the Gamma Ray Large Area Space Telescope (GLAST) mission, planned for launch in 2005. This instrument will complement the primary instrument, the GLAST Large Area Telescope Flight Investigation.

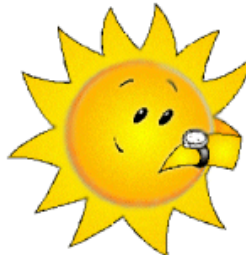
GLAST will explore the most energetic and violent events in a quest for the ultimate sources of energy in the Universe. Objects explored will include distant galaxies fueled by super massive black holes at their center, neutron stars and individual black holes that are the remnants of stars that have ended their life with an explosion (supernova) and many other stars at the extremes of mass and energy.

The GLAST mission also will explore the very high-energy component of gamma-ray bursts, which are one of the greatest mysteries of astrophysics. The Gamma-Ray Burst Monitor, along with the primary telescope, will provide the broadest energy coverage ever available on a single spacecraft for gamma-ray burst studies. Based on the results of previous missions, this energy coverage will provide crucial information for determining the nature of these illusive objects.

The Principal Investigator is Dr. Charles Meegan of NASA’s Marshall Space Flight Center. This investigation is a collaborative international effort involving a major contribution from the Max Planck Institute for Extraterrestrial Physics (MPE) in Germany. Co-Investigators include scientists from MPE and the University of Alabama in Huntsville.

Goddard Space Flight Center will manage the GLAST mission for NASA’s Office of Space Science. NASA’s cost to develop the GLAST mission is approximately \$200 million, which includes approximately \$5 million for the secondary instrument.

DAYLIGHT SAVING TIME



**Begins
April 2**

**Set clocks
ahead one
hour.**

Administrator's Safety
Message

Design for Safety

No one can deny that reaching for the stars is a risky venture, but we should be committed to doing it as safely as possible. We must think safety throughout a program or system life cycle and focus on identifying failure modes and effects in our hardware and software along the way.

A Design for Safety program — a total systems approach addressing safety issues as they are discovered — would help us meet this goal. It would allow us to continuously search for problems and assess risk and solution options from concept through operations. Designing for safety would also include the verification processes to insure the development of safe life designs.

Design for Safety tools would essentially cut the fault tree off at the roots and not allow it to grow. To do this we would depend heavily on learning and knowledge-based tools that will be developed under the Intelligent Systems program.

This technology will enable us to create systems that learn and reason for themselves and extract information and knowledge from complex distributed databases.

They will also allow us to develop the means to virtually capture the experience and insight of experts. We would use this capability to build high-level “safety oriented” supervisory tools. We would integrate them into the Intelligent Synthesis Environment’s life cycle analysis and design tools to develop and institutionalize a smart design process oriented on safety.

Once a system is operational, Design for Safety tools would use the “what if” results and advanced information technology methods to discover patterns and trends and to identify and analyze possible failures throughout the system’s life cycle.

We could also use Design for Safety tools and techniques to create a more effective workforce. We could use case studies as educational tools and let people do mock designs under the supervision of a Design for Safety intelligent agent. No tool will replace smart people, but smart tools can create even smarter people and an even stronger NASA.

While this vision requires a long-term commitment to conduct the necessary research and technology development, NASA is prepared to start making it a reality today.

The entire text of the Administrator’s Weekly Topics are posted on the NASA Home Page at:
www.nasa.gov/bios/health_messages.html

Volunteers Sought for
Wallops Open House

Are members of your civic organization interested in U.S. Navy and Coast Guard operations or aeronautical and space research activities? Are you looking for a service activity this summer for your organization? Is your organization proud of the Shore and interested in communicating this to visitors of the area?

If you answered yes to any of the above questions then your group may be interested in participating in the Public Open House at the Wallops Flight Facility from 9 a.m. to 5 p.m. on Saturday, June 24, 2000.

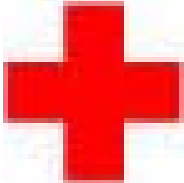
The open house will showcase the technological achievements of the organizations that are based at Wallops and the many organizations that use the facility for research purposes. Participating organizations already include NASA, Navy, NOAA, Coast Guard, the Virginia Space Flight Center, the Marine Science Consortium, Virginia Institute of Marine Science, the Chincoteague National Wildlife Refuge/National Park Service, NASA and Navy contractors, and the Maryland Air National Guard.

Organizers expect a minimum of 5,000 people to attend this event which will include aircraft displays, tours of NASA/Navy/NOAA facilities, exhibits and activities for the whole family.

If your organization is interested in supporting the open house by helping direct traffic, greeting visitors, demonstrating activities for children or providing direction or information to visitors call the NASA Wallops Public Affairs Office on x1579 or x1584.

Give the gift of life.
Give blood.

American Red Cross
Blood Drive



March 27
9:30 a.m. to
2:30 p.m.
Bldg. F-3

Your donation will be appreciated more than ever to bolster the blood supply in this area.

Call the Health Unit, x1266 for an appointment time.

Notes from the Gardner

Soil preparation is one of the most important steps in growing any type of plant. The following are some points to keep in mind.

Have your soil tested every few years. Cooperative Extension Service offices often have a soil testing lab. A test will tell you the levels of key nutrients in the soil and what fertilizers or amendments you need to add.

As soon as the ground can be worked, till or spade your garden to a depth of 8 to 10 inches. Wait until the soil is dry enough to work. To test, squeeze a handful into a ball. If you can break the ball easily, the soil is dry enough to be worked. Thoroughly worked soil should be loose and free of clumps.



The best way to enhance any type of soil is to add organic matter: old leaves, hay, grass clippings, or compost. Organic matter serves as glue, holding sandy soil particles together. In clay soils, it wedges between soil particles, loosening the soil, allowing water and air to reach plant roots.

To tell if your soil is mostly clay or sand, pick up a handful of moist soil. If you can form it into a smooth ball and it stays in that shape without crumbling, it’s probably clay. Sandy soil doesn’t hold together. Another sign of clay soil is when puddles form on the surface after watering. Water moves rather quickly through sandy soil. The ideal soil is loam, a mixture of clay and sand.

Caring for an Aging Loved One

Dr. Chris Garner will lead the Employee Assistance Program discussion group on April 6 at 11:30 a.m. in Building F-160, Room C164.

The topic is “Elder Care: Caring for an Aging Loved One”. Many people find themselves caring for an older relative and knowing the right answer may not always be easy. This discussion group will help with successful coping mechanisms, understanding the role of the caregiver and area resources.

Inside Wallops is an official publication of Goddard Space Flight Center and is published by the Wallops Office of Public Affairs, Extension 1584, in the interest of Wallops employees.

Editor Betty Flowers
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